Ethernet over VDSL2 Converter

VC-201 / VC-202

User's Manual

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Revision

Ethernet Over VDSL2 Converter User's Manual

For Models: VC-201 / VC-202

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1. Introduction

1.1 Checklist

Check the contents of your package for following parts:

- Ethernet over VDSL2 Converter
- Power Adapter
- RJ-11 Telephone line (VC-201 only)
- User's Manual

If any of these pieces are missing or damaged, please contact your dealer immediately, if possible, retain the carton including the original packing material, and use them against to repack the product in case there is a need to return it to us for repair.

1.2 Introduction to Ethernet over VDSL2 Converter

PLANET's state-of-the-art Ethernet-over-VDSL2 products are based on two core networking technologies: Ethernet and VDSL2 (Very-high-data-rate Digital Subscriber Line). This technology offers the absolute fastest possible data transmission speeds over existing copper telephone lines or coaxial cables without the need for rewiring.

The VC-201/VC-202 Ethernet over VDSL2 converters has a switching architecture with one RJ-45 10/100Mbps Ethernet port and one symmetric Ethernet over VDSL port (symmetry

means upstream and downstream rate are the same or similar) – the VDSL port can be RJ-11 connectors or BNC connector. The VC-201/VC-202 can be set to CO mode or CPE mode via a DIP switch. When the VC-20X-CO is used to connect to the other VC-20X-CPE as a standalone pair, up to 100/55Mbps asymmetric data rate within 200m and up to 30/6Mbps asymmetric data rate at 1km. This capability is ideal for use as an Ethernet extender for your existing Ethernet network.

PLANET's VDSL2 Converter solution provides a much cheaper replacement and smooth migration for existing Long Reach Ethernet (LRE) networks.

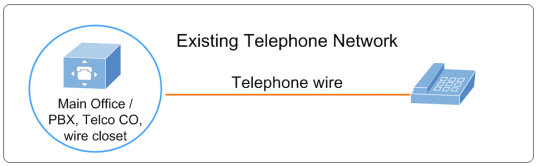
The cable specifications of the connection are listed as following:

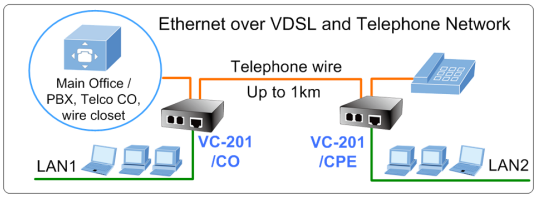
- 10BASE-T, Category 3, 4 or 5 UTP
- 100BASE-TX, Category 5 UTP
- Ethernet over VDSL, Twisted-pair telephone wires
- Ethernet over VDSL, Coaxial cable

The two drawings listed below are typical application for the Ethernet over VDSL converter.

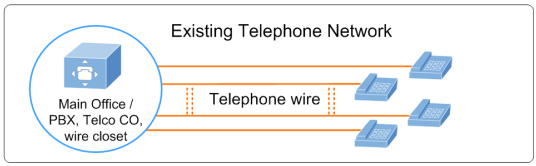
Note	Slave device (CPE) must connect to Master device (CO) through the telephone wire. Slave cannot connect to Slave and Master cannot connect to Master. To define the VC-201 to CO or CPE, please refer to section 2.2.1 for more detail.

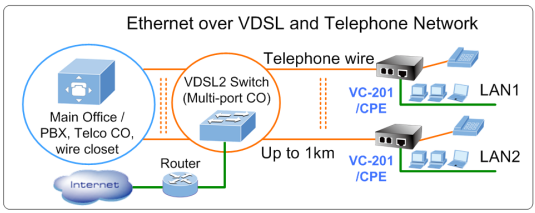
LAN to LAN Connection





Multi-LAN Connection





1.3 Key Features

The converter provides the following key features:

- Cost-effect VDSL2 CO/CPE bridge solution
- One box design, CO/CPE selectable via DIP Switch
- Complies with IEEE 802.3, IEEE 802.3u and IEEE 802.3x standards
- DMT (Discrete Multi-Tone) line coding
- Half duplex Back pressure and IEEE 802.3x Full Duplex Pause frame flow control
- Built-in POTS/ISDN splitter
- Voice and data communication can be shared on the existing telephone wire simultaneously
- Support up to 1536 bytes packet size, 802.1Q VLAN tag transparent
- VDSL2 stand-alone transceiver for simple bridge modem application
- Advantage of minimum installation time (Simply as Plug-and-Play)
- Selectable target data rate and target SNR margin
- Support extensive LED indicators for network diagnostics
- Co-work with PLANET MC family Media Chassis (MC-700/1000R/1500)
- Compact in size, easy installation

1.4 Specifications

Product		VC-201	VC-202
Hardware Specification			
Ports	**10/100Base-TX**	1 RJ-45, Auto-negotiation and Auto-MDI/MDI-X	
	VDSL	1 RJ-11, female Phone Jack	1 BNC, female connector
	PHONE	1 RJ-11, Built-in splitters for POTS/ISDN connection	-
DIP Switch		4 position DIP switch	
Functionality		• CO / CPE mode select • Selectable fast and interleaved mode • Selectable target Data Rate • Selectable target SNR mode	
Encoding		• VDSL-DM - ITU-T G.993.1 VDSL - ITU-T G.997.1 - ITU-T G.993.2 VDSL2 (Profile 12a Support), Annex A	

LED Indicators		• One Power, • 3 for RJ-11/VDSL2 WAN : - Green, LNK/ACT - Green, CO mode - Green, CPE mode • 2 for per RJ-45 10/100Base-TX port - Green, LNK/ACT. - Green, Speed	
Cabling	**Ethernet**	• 10Base-T: 2-pair UTP Cat.3,4,5 up to 100m (328ft) • 100Base-TX: 2-pair UTP Cat.5, up to 100m (328ft)	
	VDSL	Twisted-pair telephone or ISDN wires (AWG24 or better) up to 6.0k feet	50 ohm, RG58A/U, RG58C/U, RG58/U or equivalent
Performance* (Down Stream / Up Stream)		200m -> 100/55Mbps 400m -> 90/40Mbps 600m -> 70/10Mbps 800m -> 48/8Mbps 1000m -> 30/6Mbps	200m -> 100/65Mbps 400m -> 100/65Mbps 600m -> 100/58Mbps 800m -> 100/52Mbps 1000m -> 100/42Mbps 1600m-> 70/10Mbps
Power Requirement		5V DC 2A	
Operating Temperature		0~50ºC	
Storage Temperature		-25~70ºC	

Operating Humidity	10% to 90% , relative humidity, non-condensing
Storage Humidity	10% to 90% , relative humidity, non-condensing
Standard Conformance	
Regulation Compliance	FCC Part 15 Class A, CE
Standards Compliance	IEEE 802.3 10BASE-T IEEE 802.3u 100BASE-TX ITU-T - G.993.1 (VDSL) - G.997.1 - G.993.2 VDSL2 (Profile 12a Support), Annex A

* The actual data rate will vary on the quality of the copper wire or coaxial cable and environment factors.

2. Hardware Description

VC-201 provides 2 RJ-11 ports for voice connection (like telephone or ISDN) and for network line connection.

VC-202 provides 1 BNC connector and supports 50 ohm cable with distance of up to 1.6km

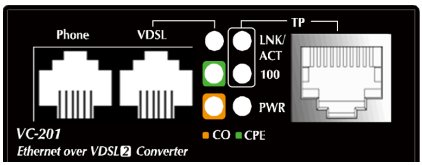
Both VC-201 and VC-202 provide 1 RJ-45 ports for two different running speed –10Mbps, 100Mbps, in the same converter and automatically distinguish the speed of incoming connection.

This section describes the hardware features of these Converters. For easier control of the converter, familiarize yourself with its display indicators, and ports. Front panel illustrations in this chapter display the unit LED indicators. Before connecting any network device to the converter, read this chapter carefully.

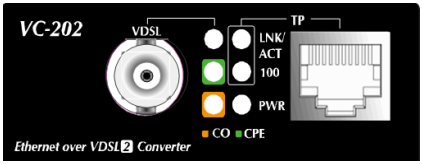
2.1 Front Panel

The units' front panel provides a simple interface monitoring the converter.

- VC-201 Front Panel



- VC-202 Front Panel



2.1.1 LED indicators

The rich diagnostic LEDs on the front panel can provide the operating status of individual port and whole system.

- System

LED	Color	Function
PWR	Green	**Lit:** Power ON **Off:** Power OFF

- VDSL

LED	Color	Function	
LNK/ ACT	Green	**Lit:**	Indicate that the VDSL link is established.
		Fast Blink:	Indicate that the VDSL link is at training status(about 10 seconds)
		Slow Blink:	Indicate that the VDSL link is at idle status
		Off:	Indicate that the port is link down
CO	Green	**Lit:**	Indicate the VDSL Bridge is running at CO mode
CPE	Green	**Lit:**	Indicate the VDSL Bridge is running at CPE mode

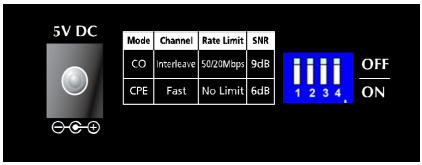
- 10/100Base-TX Port

LED	Color	Function	
LNK/ ACT	Green	**Lit:**	Indicate that the port is link up.
		Blink:	Indicate that the converter is actively sending or receiving data over that port
		Off:	Indicate that the port is link down
100	Green	**Lit:**	Indicate that the port is operating at 100Mbps.
		Off:	Indicate that the port is link down or 10Mbps.

2.2 The Rear Panel

The rear panel of the converter is shown below.

- VC-201 / VC-202 Rear Panel



2.2.1 MODE DIP Switch

The converter provides 4 selective transmission modes. By switching the transmission modes, you can obtain a best transmission mode to suit with phone line quality or

distance of connectivity. The following is the summary table of transmission setting, bandwidth and distance extensibility tested for AWG 24 (0.5mm) twisted-pair without noise and cross talk.

	DIP-1	DIP-2	DIP-3	DIP-4
	Mode	Channel	Rate Limit	SNR
OFF	CO	Interleave	50/20 Mbps	9dB
ON(default)	CPE	Fast	No Limit	6dB

- CO / CPE
  - CO (Central Office) – the Master device mode, usually the CO device will be located at the data center of ISP or enterprise to link to the backbone.
  - CPE (customer premises equipment) – the Slave device mode, usually the CPE device will be located at branch office, home or remote side as the long reach data receiver. The CPE can be connect to the PC, IP Camera or Wireless Access Point and etc network devices.
- Fast and Interleave mode: (For CO Mode only)
  - Fast mode guarantees a minimum end to end latency less than 1 ms.
  - Interleaved mode provides impulse noises protection for any impulse noise with a duration less than 250 us. Interleaved mode has a maximum end to end latency of 10m sec.

- Rate Limit: (For CO Mode only)

  User has the ability to select fixed data rate. When Rate Limit is selected, the system will lock the date rate at 50Mbps/20Mbps whenever the calculated SNR margin is higher than 9 dB. This gives best system stability.

- Target SNR (Signal Noise Ratio) Margin: (For CO Mode only)

  When fixed SNR margin is selected, the system will maintain the SNR margin at 9 dB across all usable loop length.

Please power off the converter before making any transmission mode adjustment.

VC-201 and VC-202 require 5V DC power input. It will conform to the bundled AC adapter. Should you have the problem to make the power connection, please contact your local sales representative.

Note	1.The device is a power-required device, it means, it will not work till it is powered. If your networks should active all the time, please consider using UPS (Uninterrupted Power Supply) for your device. It will prevent you from network data loss or network downtime. 2.In some area, installing a surge suppression device may also help to protect your converter from being damaged by unregulated surge or current to the converter or the power adapter.

3. Installing and Using VDSL Converter

3.1 Install the Ethernet Over VDSL2 Converter

The Converter does not require any software configuration. Users can immediately use any feature of this product simply by attached the cables and plug power on. There is some key limitation on the Ethernet over VDSL2 converter. Please check the following items:

- The device is used for Point-to-Point connection only (Master device to Slave device) and allows data and voice work on the same telephone or ISDN lines.
- VC-201 Two RJ-11 connectors for VDSL port. One for voice device connection (like telephone) and the other one for network link connection.

  Depending on the quality of telephone line, the maximum distance of one VDSL segment is 1.5km (5000ft) with AWG 24 telephone wires.
- VC-202 1 BNC connector and supports 50 ohm cable. Depending on the quality of coaxial cable, the maximum distance of one VDSL segment is 1.6km with 5C coaxial cable.
- The distance will change by the quality of telephone wires and coaxial cables.

3.1.1 VC-201 LAN to LAN connection

Two sets of the converters could be used to link two local Area networks that are located in different place. Through the normal telephone line, it could setup a to 100/55Mbps

asymmetric backbone, but one converter must be Master (CO mode) and the other one is Slave (CPE mode).

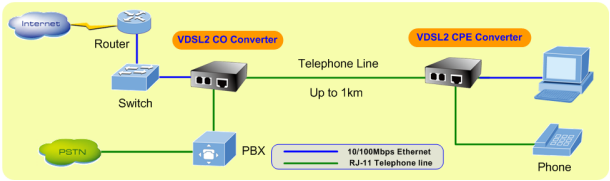


Figure 3-1: VC-201 LAN to LAN connection

3.1.2 VC-201 Connect to Multi-Port Master

In order, to built up a local Internet in apartment, hotel, campus and hospitality environment.

The Multi-port Master (for example, VC-810S VDSL2 Switch) need to be placed In the wiring center (MDF room) and connect to the telephone line system, on the other hand, need to install a Slave (VC-201 CPE) converter on the individual client side and connect to the Multi-port Master through the telephone lines.

When deciding where to put the converter then you must ensure:

- It is accessible and cables can be connected easily.
- Cabling is away from sources of electrical noise such as radios, transmitters and power lines and fluorescent lighting fixtures.
- Water or moisture can not enter the unit Converter.

- Air flow around the unit and through the vents in the side of the case is not restricted (company recommend that you provide a minimum of 25mm inch clearance)

To prolong the operational life of your units:

- Do not place objects on top of any unit or stack

3.2 Connecting VC-201

3.2.1 Connecting Standalone PC

Refer to the following procedures to setup the VC-201 to a standalone PC.

1. Set the VC-201 to be CO mode or CPE mode from the DIP switch at the rear panel.
2. Power on the VC-201 by connecting its power source.
3. Power LED will illuminate.
4. Connect VDSL line from another VDSL device to VDSL port of the VC-201.
5. LNK LED will from blinking to illuminate.
6. Connect telephone to the PHONE port.
7. Connect Ethernet port to PC Network Interface Card (NIC) via regular Cat. 5 cable.

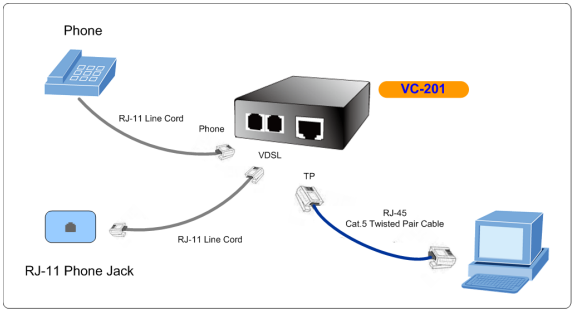


Figure 3-2: Connecting Standalone PC

3.2.2 Connecting Multiple PCs to an Ethernet LAN

Refer to the following procedures to setup the VC-201 to an Ethernet LAN.

1. Set the VC-201 to be CO mode or CPE mode from the DIP switch at the rear panel.
2. Power on the VC-201 by connecting its power source.
3. Power LED will illuminate.
4. Connect VDSL line from another VDSL device to VDSL port of the VC-201.
5. LNK LED will illuminate.
6. Connect telephone to the PHONE port.
7. Connect Ethernet port to Ethernet Switch (or Broadband Router) via regular Cat. 5 cable.

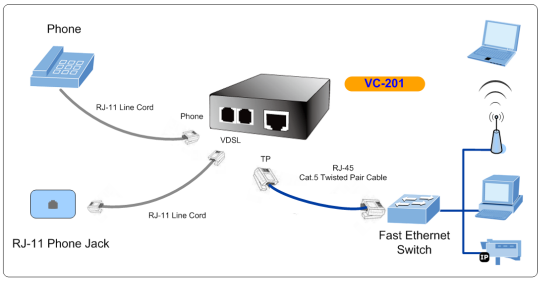


Figure 3-3: Connecting Multiple PCs to an Ethernet LAN

Note	Please refer to your Ethernet device User's Manual for the device's set up information.

3.3 Connecting VC-202

3.3.1 Connecting Standalone IP device

Refer to the following procedures to setup the VC-202 to a standalone PC.

1. Set the VC-202 to be CO mode or CPE mode from the DIP switch at the rear panel.
2. Power on the VC-202 by connecting its power source.
3. Power LED will illuminate.
4. Connect coaxial cable from another VDSL device to VDSL BNC port of the VC-202.

5. LNK LED will from blinking to illuminate.
6. Connect Ethernet port to Ethernet device via regular Cat. 5 cable.

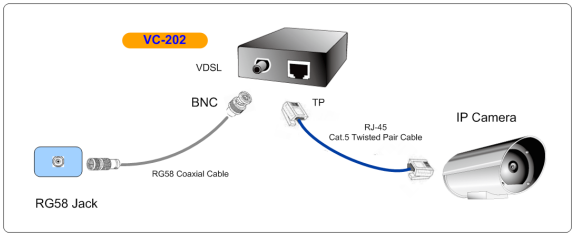


Figure 3-4: Connecting Standalone IP device

3.3.2 Connecting Multiple PCs to an Ethernet LAN

Refer to the following procedures to setup the VC-202 to an Ethernet LAN.

1. Set the VC-202 to be CO mode or CPE mode from the DIP switch at the rear panel.
2. Power on the VC-202 by connecting its power source.
3. Power LED will illuminate.
4. Connect VDSL line / coaxial cable from another VDSL device to VDSL BNC port of the VC-202.
5. LNK LED will illuminate.
6. Connect Ethernet port to Ethernet Switch (or Broadband Router) via regular Cat. 5 cable.

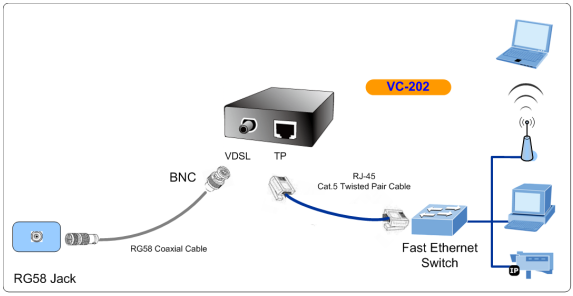


Figure 3-5: Connecting Multiple PCs to an Ethernet LAN

Note	Please refer to your Ethernet device User's Manual for the device's set up information.

3.4 Chassis Installation and Rack Mounting

To install the VDSL2 Converter in a 10-inch or 19-inch Converter Chassis with standard rack, follow the instructions described below.

Step 1: Place your VC-201/VC-202 on a hard flat surface, with the front panel positioned towards your front side.

Step 2: Carefully slide in the module until it is fully and firmly fitted into the slot of the converter chassis.

Figure 3-6: Insert a VDSL2 converter into an available slot

Step 3: Attach a rack-mount bracket to each side of the Chassis with supplied screws attached to the package.

Step 4: After the brackets are attached to the Converter Chassis, use suitable screws to securely attach the brackets to the rack

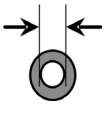
Step 5: Proceed with the steps 4 and steps 5 of session 3.2 Stand-alone Installation to connect the network cabling and supply power to your Converter Chassis.

Caution	You must use the screws supplied with the mounting brackets. Damage caused to the parts by using incorrect screws would invalidate your warranty.

4. POWER INFORMATION

The power jack of VC-20x is with 2.5mm in the central post and required +5VDC power input. It will conform to the bundled AC-DC adapter and Planet's Media Chassis. Should you have the problem to make the power connection, please contact your local sales representative.

Please keep the AC-DC adapter as spare parts when your VC-20X is installed to a Media Chassis.



2.5mm
DC Receptacle 2.5mm
+5V for each slot

DC receptacle is 2.5mm wide that conforms to and matches the VDSL2 Converter 2.5mm DC jack's central post. Do not install any improper unit, model of the VDSL2 Converter

5. Troubleshooting

SYMPTOM:

VDSL LNK LED does not lit after wire is connected to the VDSL port.

CHECKPOINT:

1. Verify the length of the wire connected between two VC-201 is not more than 1.5km. Please also try to adjust the DIP switch or VC-201 to other SNR mode.
2. Please note you must use one VC-201 with CO mode and the other VC-201 with CPE mode, connect to each other to make it work.

SYMPTOM:

TP LNK/ACT LED does not lit after cable is connected to the port.

CHECKPOINT:

1. Verify you are using the Cat.5 or better cable with RJ-45 connector to connect to the port.
2. If your device (like LAN card) supports to Auto-Negotiation, please try to manual set at a fixed speed of your device to solve this problem.
3. The converter and the connected device's power are on or not.
4. The port's cable is firmly seated in its connectors in the switch and in the associated device.

5. The connecting cable is good and with correct type.
6. The connecting device, including any network adapter is functional.

6. FAQ

Q1: What voltage that VC-201/VC-202 used?

A1: 5VDC, 2A

Q2: What is VDSL2?

A2: VDSL2 (Very High-Bit-Rate Digital Subscriber Line 2), G.993.2 is the newest and most advanced standard of xDSL broadband wire line communications.

Designed to support the wide deployment of Triple Play services such as voice, data, high definition television (HDTV) and interactive gaming, VDSL2 enable operators and carrier to gradually, flexibly, and cost efficiently upgrade exiting xDSL-infrastructure.

Q3: What is the best distance for VC-201?

A3: In order to guarantee the stability and better quality of network, so we would suggest the distance in 1 kilometer is the best for VC-201.

Q4: What is the best date rate for VC-201?

A4: We provide the data rate of the VC-201 is up to 55Mbps/100Mpbs (upstream / downstream) in 200 meters.

Q5: Can VC-201 compatible with VC-102M / VC-102S?

A5: Our VC-201 is base on ITU-T G.993.2 VDSL2, and VC-102M / VC-102S is VDSL1, so it can not compatible with VC-201.

Q6: Can VC-201 compatible with VC-200M / VC-200S?

A6: Currently NO, although VC-201 and VC-200M/200S are base on ITU-T G.993.2 VDSL2, but with different chip-set specification, so far they are not compatible with each other.

Q7: What is SNR and what's the effect?

A7: In analog and digital communications, Signal-to-Noise Ratio, often written SNR, is a measure of signal strength relative to background noise. The ratio is usually measured in decibels (dB).

In digital communications, the SNR will probably cause a reduction in data speed because of frequent errors that require the source (transmitting) computer or terminal to resend some packets of data. SNR measures the quality of a transmission channel over a network channel. The greater the ratio, the easier it is to identify and subsequently isolate and eliminate the source of noise.

Generally speaking, the higher SNR value gets better line quality, but lower performance.

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